

MODIS NDVI Change Detection Techniques and Products Used in the Near Real Time ForWarn System for Detecting, Monitoring, and Analyzing Regional Forest Disturbances

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This presentation discusses MODIS NDVI change detection methods and products used in the ForWarn Early Warning System (EWS) for near real time (NRT) recognition and tracking of regionally evident forest disturbances throughout the conterminous US (CONUS). The latter has provided NRT forest change products to the forest health protection community since 2010, using temporally processed MODIS Aqua and Terra NDVI time series data to currently compute and post 6 different forest change products for CONUS every 8 days. Multiple change products are required to improve detectability and to more fully assess the nature of apparent disturbances. Each type of forest change product reports per pixel percent change in NDVI for a given 24 day interval, comparing current versus a given historical baseline NDVI. EMODIS 7 day expedited MODIS MOD13 data are used to obtain current and historical NDVIs, respectively. Historical NDVI data is processed with Time Series Product Tool (TSPT); and 2) the Phenological Parameters Estimation Tool (PPET) software. While each change products employ maximum value compositing (MVC) of NDVI, the design of specific products primarily differs in terms of the historical baseline. The three main change products use either 1, 3, or all previous years of MVC NDVI as a baseline. Another product uses an Adaptive Length Compositing (ALC) version of MVC to derive an alternative current NDVI that is the freshest quality NDVI as opposed to merely the MVC NDVI across a 24 day time frame. The ALC approach can improve detection speed by 8 to 16 days. ForWarn also includes 2 change products that improve detectability of forest disturbances in lieu of climatic fluctuations, especially in the spring and fall. One compares current MVC NDVI to the zonal maximum under the curve NDVI per pheno-region cluster class, considering all previous years in the MODIS record. The other compares current maximum NDVI to the mean of maximum NDVI for all previous MODIS years.

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